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ABSTRACT

This survey manual evaluates the important points of functionality of school facilities in logical order. Instructions are given for the use of the manual, and separate sections present guidelines for evaluation of the following--(1) site, (2) building structure, (3) administrative spaces, (4) classrooms, (5) special rooms, (6) general service areas, (7) heating, ventilation, and air conditioning, (8) lighting and electrical equipment, (9) fire protection, and (10) water supply and sanitary facilities. (FS)

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1962

A MANUAL FOR EVALUATING SCHOOL FACILITIES

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Issued by
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Basic Considerations

Recognition of certain realities must precede any serious evaluation of school building facilities. In its evaluation of existing facilities, the survey team must have criteria such as these in mind, and apply them to every piece of school property.

First, from the day of construction every school building begins to deteriorate. Furthermore, over a period of years, the structure becomes physically worn and educationally obsolescent. Changes occur in the educational process, in the ways of doing things, in the building design, in the school's total environment, and these effects cannot be arrested no matter how well the building is maintained. An attempt to maintain school buildings indefinitely is both futile and expensive. If this process is ignored or misunderstood, education will inevitably suffer.

Second, educational and financial advantages and disadvantages of remodeling, adding and replacing facilities, must be carefully weighed in the light of several factors: location in relation to student population, capacity in relation to need, physical condition and resulting costs of operation and maintenance, conditions affecting health and safety, and adequacy and appropriateness for the designed school program. There is a high correlation between the age of the building and its various deficiencies in these areas, but functionality rather than age should be the factor that determines the fate of a building.

Third, if a building is to be abandoned from regular use, consideration should be given first to its suitability for other school purposes. If it cannot be put to any school use, thought should be given to possible uses for other public purposes before a decision is made to sell the property.

Fourth, the decision to continue any building or site as a part of the school plant must be based upon its reasonable conformity to the following criteria: (1) the facility is likely to be needed at the place where located, (2) the facility is reasonably safe and healthful or can be made so without undue expense, (3) the facility has, or can economically be provided with, all necessary features to promote the desired school program, and (4) the facility can be put into good condition and operated and maintained at reasonable cost.

Fifth, replacement either in whole or in part, far from being a necessary evil to be avoided as long as possible, may be the only way to provide adequate educational services.

Foreword

In this period of seething confusion and change in our concepts of what tasks public education should perform, there is accompanying concern regarding the buildings which house the schools. Whether the reasons for such concern are increasing enrollment, decreasing enrollment, expanded curricular offerings, delapidated buildings, or community pride, with increasing frequency schools are requesting surveys of existing facilities to determine present and future needs. In an effort to assist in the process, this survey manual is designed to be used by local staff and citizens' committee or by an informed individual to evaluate the important points of functionality of the present facilities in logical order.

The school plant of any community represents a major investment of public funds, and it behooves all concerned to make the most effective use of existing facilities worthy of continued use.

With this manual the appraisal of the school plant becomes a learning experience. A citizens' group working together on the evaluation of a school building will gain much information from the manual, from the school people consulted, and from one another. As a result of this experience, they will see the plant as an educational facility rather than as a shelter of brick, mortar, and stone.

With this manual as a guide, the average citizen who is reasonably familiar with the educational program can see for himself how his child's school rates functionally. He will recognize in what characteristics it is deficient and get some indication of what steps will be necessary to make up deficiencies which may appear.

The manual is in experimental form, to be revised and reprinted as its use might indicate needed changes. It is hoped that the booklet will be used as it is intended and that suggestions for its improvement will be made.

State Superintendent

Identification Data

Name of School System _____ Dist. No. _____

Address _____ County _____

Administrator _____

Name of Building Evaluated _____ Grades _____

Principal for Building Evaluated _____

Board of Education: _____

_____

_____

_____

_____

_____

_____

Name of Scorer _____

Position of Scorer _____

Others Participating in the Evaluation

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

"In the conditions of modern life the rule is absolute, the race which does not value trained intelligence is doomed. Not all your heroism, not all your social charm, not all your wit, not all your victories on land or at sea, can move back the finger of fate. Today we maintain ourselves. Tomorrow science will have moved forward yet one more step, and there will be no appeal from the judgment which will then be pronounced on the uneducated."

--ALFRED NORTH WHITEHEAD

Directions for Scoring

Generally speaking, a comprehensive school facilities survey consists of three major steps: (1) determining the total school plant needs, (2) appraising the existing school plant facilities in relation to these needs, and (3) formulating proposals to close the gap between needs and existing facilities. The collection and analysis of the necessary information and the formulating of sound recommendations involve the use of many detailed procedures of more or less technical nature.

A school building should be educationally functional. It must have structural stability, it must be weather tight; it must be equipped to control light, air, ventilation, and temperature; and it must be arranged to serve the program it houses. The condition and arrangement of the building determine to a great extent whether or not it is educationally functional. Application of these principles at the time of a school plant survey requires that this study be designed to include careful analysis of the school program in order to ascertain the necessary facilities. The resulting list of facilities then becomes a basis for evaluating the existing school plant and for formulating recommendations for improved facilities.

Effective use of this manual is possible only when the survey team is familiar with the educational program to be housed and has carefully studied this workbook. It should be noted first that the program to be housed must look to the future and is not necessarily the present program. A second prerequisite is a knowledge of present and predicted enrollments. This information in a brief form should be entered in the workbook on the blank pages provided.

Some of the information needed for answering various questions about the school plant will be available only from personnel who use the facilities to which reference is made. For best results, the school superintendent and/or principal and the custodian should accompany the survey team to answer technical questions when the need arises. Teachers should be consulted to answer questions concerning classrooms, equipment, and other instructional facilities. The school architect and engineer may also be called on to contribute information.

Frequently the survey team is provided a copy of the plans for the existing building to assist in judging adequacy of room size, suitability of location, and efficiency of arrangement. If such plans are not available, usually the school has a teacher or an advanced student in a mechanical drawing class who can sketch floor plans with accurate measurements.

An elementary school, for purposes of scoring, is defined as one which

houses the kindergarten and the first six or eight grades or any combination of these.

A secondary school comprises any span of grades beginning with the next grade following the elementary school and ending with grade 12.

This manual has ample space provided for making sketches and notes about such items as suitability and adequacy of academic or special rooms for which judgments are not to be made or scores assigned until all areas have been examined.

The school facilities survey as outlined in this manual covers ten different major areas of the school plant as follows:

I. Site

II. Building Structure

III. Administrative Spaces

IV. Regular Classrooms

V. Special Rooms

VI. General Service Areas

VII. Heating, Ventilating, and Air Conditioning

VIII. Lighting and Electrical Equipment

IX. Fire Protection

X. Water Supply and Sanitary Facilities

At the beginning of each of the ten major areas and at the beginning of each sub-area, there are brief statement which give recommendations of acceptable present day standards for that particular area of the plant. The school plant being evaluated should be rated and scored according to the standards as presented and in light of the educational program the plant is expected to house. There are two fundamental questions always to be answered: (1) What is the physical condition of the plant, and (2) how well does the school plant fulfill its purpose?

Instructions for Evaluating and Rating School Facilities

The school facilities survey should begin with a thorough inspection of the school site and proceed through the ten major areas in the order listed above. Under each of the major headings and under the sub-headings are questions to be answered by the survey team or scorer.

The five-point scale shown on the next page should be used in evaluating, rating and scoring all questions. It is particularly important to adhere to the scale ratings and their accompanying explanations in marking all of the questions.

Each question has a possible maximum rating of five (5) points. This is the rating to be recorded in the bracket at the left of each question if the answer is an unqualified "excellent." As the answers are less satisfactory, the scorer assigns a progressively lower rating. The scorer should keep in mind that a rating of 3 is average, or "as it should be"; thus he should lower the rating as the facility fails to meet this norm and raise it only when the facilities definitely exceed the average.

In cases where facilities are "missing but needed," the question should be rated "M" and included in the evaluation as zero. For example, no credit should be given for questions pertaining to location, condition, and equipment of non-existent needed facilities.

If the question refers to an item that is considered undesirable or unnecessary, "not applicable," the scorer should place the letter "X" in the bracket, and the question should be disregarded in calculating the score.

Use this five-point scale in evaluating and rating all questions.

5—Excellent:	Unusually good or in exceptionally fine condition.
4—Very Good:	In "better than average" or outstanding condition.
3—Good:	Suitable for the purpose, or "as it should be"; in good, average, and acceptable condition.
2--Poor:	Lacking in stability or quality, in dangerous condition; should be repaired or replaced.
1—Unsatisfactory:	Not fulfilling the needs and requirements; very dangerous and should be replaced immediately.
M—Missing but Needed:	Provisions or conditions missing but needed (for instance, a school fence).
X—Not Applicable:	Provisions or conditions missing but not applicable (for instance, one-story schools may not need stairways).

When all questions have been evaluated and rated, summarize on Chart I, page 5, as follows:

1. Column (1) is completed and shows the total number of questions submitted for evaluation and rating under each major area and sub-area of the plant.

2. In column (2) simply record the total number of questions checked for each of the ten major areas. Example: Under the major heading "Site" there are 24 questions. If two of the questions are rated "x", not applicable, record only 22 in column (2).

3. In column (3) record the sum of the ratings for all of the questions under each major area. Example: If all 24 questions under "Site" receive a maximum rating of 5, the total rating is 120. If every question receives a rating of one (1), the total site rating is 24 These ratings represent hypothetical extremes, and the rating for each question and major area will no doubt fall somewhere between them. Always keep in mind that a rating of 3 is average, or "as it should be"; thus to receive a higher rating a facility must really be "outstanding" or "exceptional."

4. In order to get a "score" for each of the ten major areas of the plant based on the five-point scale of evaluation, divide column (3) by column (2) and record in column (4).

After all questions under the ten major areas have been rated, the scores as reported in column (4) of Chart I should be indicated on Chart II, page 6, by a red dot on the appropriate vertical line according to the scale given at the left. This profile chart when completed will show the strong and the weak points of the school plant.

CHART I

SUMMARY OF EVALUATION AND RATING OF SCHOOL FACILITIES

	Number of Questions (1)	Questions Checked (2)	Total Rating for each Major Area (3)	Score Equals No. 3 ÷ by No. 2 (4)
I. Site	24			
II. Building Structure	28			
III. Administrative Spaces	45			
IV. Regular Classrooms	30			
V. Special Classrooms	84			
VI. General Service Areas	65			
VII. Heating, Ventilating and Air-Conditioning	20			
VIII. Lighting and Electrical Equipment	20			
IX. Fire Protection	15			
X. Water Supply and Sanitary Facilities	30			
Total	361			

DIRECTIONS:

1. Column (1) has been completed and shows the total number of questions submitted for evaluation and rating under each major heading.

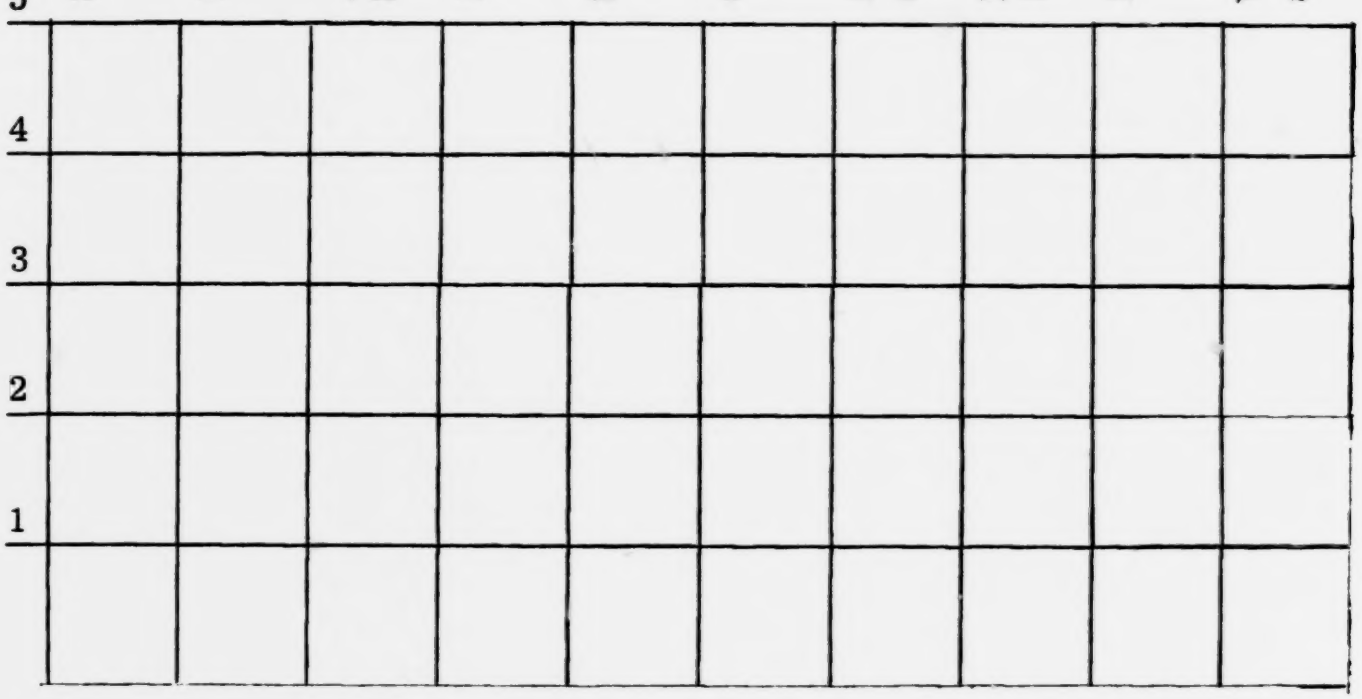
2. In column (2) record the total number of questions checked under each major heading. For example, record 22 of the 24 questions under the major heading Site if two (2) were rated "X", not applicable.

3. In column (3) record the sum of the ratings for all of the questions.

4. Record in column (4) the score, which is obtained by dividing column (3) by column (2), for each of the ten major headings. This score is based on the five-point scale of evaluation.

CHART II

PROFILE CHART
HOW OUR SCHOOL BUILDING RATES



DIRECTIONS:

As directed at the bottom of page 5, on the above scale indicate with a large red dot on the appropriate vertical line according to the scale given at the left, the scores as reported in column (4), Chart I, for each of the ten major areas of the plant.

The profile of the school plant presents a picture of how well it serves its purpose. The decision as to whether it should be retained as it is, remodeled, expanded, or abandoned involves financial and other considerations which vary with the community.

If, in the course of the evaluation, the appraiser discovers structural defects which cast doubt on the soundness of the building, an architectural engineer should be consulted immediately. A building with structural defects constituting a hazard should not be kept even in temporary use.

I. Site

A school site for a modern educational program is much more than land upon which to erect a building. The site has many educational uses and is a functional part of the school plant. In addition to providing space for the buildings, a good site should include areas for physical education, parking, loading and unloading pupils, outdoor laboratories, drives, walks, recreation, and supplementary space such as might be anticipated.

A poorly arranged or under-developed site, like a badly designed or partially equipped classroom, defeats in part the very purpose for which it was obtained. A tract of land outside the building or a bit of floor space within can help or hinder the work of the school, promote safety, or invite accidents.

The site problem obtrudes itself not only with respect to new schools but also when replacements are required. When there is a question of whether or not to undertake expensive improvements such as the construction of a new roof, the installation of a new heating plant, structural changes to accommodate such new requirements as cafeterias, libraries, or similar facilities, the school officials must ask themselves the same basic questions as those encountered in planning a new building. They must inquire, among other things, into the continued adequacy of the site and the changes taking place in the school service area.[1]

A. Size of Site

A good school site should be centrally located and easily accessible for all pupils. Sites of inadequate size have been one of the primary causes of early school building obsolescence and curtailed school-community programs.

Size Recommendations [2]

(a) Elementary -	Five acres plus one additional acre for each 100 pupils.
(b) Junior High School -	Twenty acres plus one additional acre for each 100 pupils.
(c) Senior High School -	Thirty acres plus one additional acre for each 100 pupils.

	Recommended Maximum Walking Distance for Pupils [3]	Recommended Maximum Time for School Bus Routes [4]
(a) Grades 1-3	Three-quarter mile	1 hour
(b) Grades 4-6	Three-quarter mile	1 hour
(c) Grades 7-9	One and one-half mile	1 hour
(d) Grades 10-12	Two miles	1 hour

[1] University of Michigan, Economic Planning for Better Schools, 1960, p. 67.
[2] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 23.
[3] Ibid, p. 21.
[4] Kansas State Department of Public Instruction, Bulletin 301, 1962.

( ) 1. Is the site large enough for the number of pupils who will attend the school?

( ) 2. Is the site readily accessible to public transportation lines, to hard surface roads, and walks?

( ) 3. Is the location of the site as near the center of the present and anticipated school population as local conditions make advisable?

( ) 4. Does the site have adequate facilities for a supply of pure water, accessible fire hydrants, and sewage disposal?

( ) 5. Are walking distances and time spent on buses in accordance with recommendations?

B. Orientation

The building should be located on the site to permit expansion of the building and allow as much area as possible for playground purposes. It is preferable to set a one-story building back from the street at least 50 feet. If the building has more than one story, the distance should be sufficient to allow for an aesthetic setting. The building should be arranged on the site so that its best elevation faces the most used approach. For proper drainage, the building should be set on the highest elevation so that the ground slopes away from the building in all directions.

It is important to note whether there are proper layouts for walks, drives, and parking areas. Walks should be conveniently located to avoid walking over lawns, shrubs, and across drives. They should be sufficiently wide to accommodate pupil traffic and should be properly maintained. It is recommended from the standpoint of safety that a school have a safe and convenient bus loading and unloading area on the site. Roadways to the building should be from a side street, if one is available. Driveways should not encircle the building. Intersection drives and walks should be avoided. A parking area sufficiently large should be provided on the site for teachers, visitors, and all students that drive cars to school.

( ) 6. Are the shape and location of the building appropriate to allow for expansion?

( ) 7. Does the building face the most used approach?

( ) 8. Is the site properly drained to provide grounds free from surface water?

( ) 9. Are walks properly built and located?

( ) 10. Are parking areas sufficiently large?

( ) 11. Are service drives safe and functional?

C. Site Safety and Environment

The site should be free from disturbing noises, obnoxious odors, and unsanitary conditions. Preferably children should not need to cross railroad tracks or main highways to reach schools. Corners and intersections should be unobstructed for all on-coming traffic. Location of a site next to a main highway or close to airports, factories, warehouses, gas storage tanks, electrical generators, or similar hazards should be avoided. Consideration should also be given to the attractiveness and wholesomeness of the neighborhood in which the school is located and to trends in neighborhood development.

The environment of the site should be such that pupils will have a feeling of pride in their school. The site should be attractively landscaped. The soil should be free from rocks and debris and provisions should be made for watering. A portion of the site at the immediate front and perhaps side of the building should be seeded to lawn with shrubs and trees so located as to contribute to the beauty of the school building. Plant or shrub screens should be used to hide unsightly areas and to separate drives, parking, and play areas from the remainder of the site. Hedges and shrubbery should be kept closely trimmed, grass mowed, and weeds eliminated. Safety fences should be provided where needed.

( ) 12. Is the site location free from traffic hazards, obnoxious odors, dirt, and noise?

( ) 13. Is the site location outside the approach pattern of an airport?

( ) 14. Is it unnecessary for children to travel hazardous routes to reach school?

( ) 15. Is the site attractively planned and landscaped?

( ) 16. Are the grounds well maintained?

( ) 17. Are adequate provisions made for watering?

( ) 18. Are safety fences provided where needed?

D. Recreational and Activity Areas

It is recommended that school recreational areas should be planned in cooperation with other public agencies providing outdoor recreational facilities and services so that all of the public playground facilities might be utilized to supplement one another for a joint program of school and community recreation.

Playground areas for elementary children should be easily accessible and large enough to accommodate all of the children at one time. The playground should provide game areas; apparatus such as climbing structures, horizontal ladders and bars, slides and see-saws; a paved area with various game courts marked off; and protected bicycle storage facilities.

For secondary pupils a work area should be developed for such courses as biology and agriculture. Space should be provided for physical education and recreation areas as follows: soccer, softball, baseball, football, field hockey, speedball, and archery; paved areas should be provided for such games as tennis, volleyball, handball, and shuffle board. An athletic field should be provided for football, baseball, and track, with suitable spectator provisions.

Playground space, practice areas, and athletic fields should be free of all hazards and should have rapid and complete drainage.

( ) 19. Do school officials and community planning agencies work cooperatively in developing recreational areas?

( ) 20. Are adequate, well equipped play areas provided?

( ) 21. Is the play surface comparatively free from hazards?

( ) 22. Is playground equipment safe?

( ) 23. Are the playground and outdoor work and recreational areas easily accessible to pupils who use them?

( ) 24. Are sufficient provisions made for physical education on the secondary level?

_____ Number of items checked for the SITE area.

_____ Total rating.

II. Building Structure

In order to serve its purpose as a tool to promote and to enhance teaching and learning, a school building should be durable in construction, functional, harmoniously arranged and aesthetically pleasant.

A. Physical Condition of Building - Exterior

The building should be structurally sound. The foundation should be free from shifting, sinking, or cracking. Chimneys, parapets and all walls should be plumb. All exterior doors must open outward, must be equipped with panic bolts, and should be properly marked. Doors, window frames, and all exterior wood should be in good repair and painted. All door and window panes should be in place and properly glazed.

The gross structure of the building should be of durable, fire-resistant material and meet national and city building codes. The roof should be of plain durable construction in good repair and should provide for proper drainage. The building should be free from ornamentation which may deteriorate rapidly. All brick work should be properly pointed-up.

Any covered walkways or connecting corridors should be well maintained.

( ) 1. Are the buildings attractively grouped on the site and placed so as to provide for efficient use of the total area?

( ) 2. Is the building situated and planned so as to meet future expansion needs?

( ) 3. Is the building free from ornamentation which may deteriorate rapidly?

( ) 4. Is the gross structure of the building composed of durable, fire-resistant materials?

( ) 5. Does the building have a plain, durable roof with adequate provision for drainage?

( ) 6. Are there any signs of deterioration or failure of footings, foundations, or piers?

( ) 7. Is the exterior of the building free from any structural cracks, water damages, or defective mortar?

( ) 8. Are flashings, gutters, and downspouts in good condition?

( ) 9. Are doors, door frames, windows and window frames in good repair?

( ) 10. Do all exit doors open outward and are they equipped with panic hardware?

( ) 11. Does the general appearance of the exterior of the building encourage student cooperation in maintenance?

( ) 12. Has an architect or an engineer inspected the building and assured its structural safety?

B. Physical Condition of Building - Interior

The building should be in good repair and free from unnecessary noise. Floors and stairs should be rigid. Entrance areas should be provided with interdoors. Floors should be perfectly level, finished with hardwood or a resilient floor covering. Walls and ceilings should be flat, true and smooth, and painted in light pastel colors. The interior of the building, including the storage areas, should be thoroughly clean and orderly. According to the National Council on Schoolhouse Construction, the stairways should be equipped with firm handrails, should be at least four feet wide and well lighted, and should be provided with non-skid stair treads 10 1/2 inches wide and with 6-inch risers. Under the same authority, there should be an intermediate landing for stairs with a ten-foot rise. It is preferable to use ramps for a rise of three steps or less. The arrangement of the building should be such that all students may be evacuated in no more than three minutes.

All corridors, stairs, and exits must provide direct outlet from the building. Every room should have direct access to the corridor. The corridor should have a minimum width, without lockers, of 104 inches, plus one foot for locker space on one side and two feet if lockers are on both sides.[1] Corridors should be free from obstructions, pockets, and dead ends and the floor materials should be fire-resistant. Corridors should be acoustically treated.

Spaces under stairways should not be used for storage of flammable materials.

[1] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, pp. 159-160.

The building should be free of all concealed or "dead" spaces—hollow spaces between partitions and under floors, where dangerous gases may accumulate and through which fire may spread. Attic space should not be used for storage of flammable materials. Regular disposal should be made of all oily rags, paints, and varnishes.

( ) 13. Are wood floor joists adequate and free from any signs of dry rot or termite damage?

( ) 14. Has there been any cutting and altering of floor joists, additional loads imposed, or any damage by water?

( ) 15. Do non-supporting classroom partitions make it possible to change size and arrangement of rooms?

( ) 16. Are stairways provided with continuous handrails at correct heights?

( ) 17. Do stairs and landings have non-slip treads?

( ) 18. Are corridors free from obstructions, pockets, and dead ends?

( ) 19. Are corridor floor materials fire-resistant?

( ) 20. Are corridors and stairways provided with adequate illumination at all times?

( ) 21. Are corridors acoustically treated?

( ) 22. Are spaces under stairways, in attics, and other areas kept clean and safe from becoming a fire hazard?

( ) 23. Are corridors and stairways attractively painted in keeping with the environment of the entire plant?

( ) 24. Are lockers provided in sufficient number to meet the needs of all students?

( ) 25. Do the general characteristics of the corridors and stairways provide for safety and health?

( ) 26. Are the corridor and stairway areas free from structural weaknesses?

( ) 27. Does the general appearance of the interior of the building encourage student cooperation in maintenance?

( ) 28. Do all building exit doors open outward, are they clearly marked with legal exit lights, and are they equipped with panic hardware?

_____ Number of items checked for BUILDING STRUCTURE area.

_____ Total Rating

NOTES:

III. Administrative Spaces

A. General Office

The administrative offices should be located on the ground floor near the main entrance. They should be planned to feature hospitality and ease of access. The administrative space should be designed for (1) receiving pupils and adults; (2) accommodating routine office work—clerical, typing, and stenographic services; (3) communicating by mail, telephone, radio, and bulletins; (4) duplicating materials; (5) filing, keeping and using records; (6) handling money; (7) pupil counseling; (8) storing work materials and orderly accounting for disbursement of supplies; (9) providing for personal conveniences of the staff; and (10) providing a fireproof vault.

( ) 1. Is the administrative office located on the first floor adjacent to the main entrance?

( ) 2. Is the size of the office suite adequate?

( ) 3. Is the arrangement of the office space functional for effective use by the clerical staff with a minimum amount of interference by the public?

( ) 4. Are the office spaces attractively decorated and properly lighted?

( ) 5. Is the general office equipped with needed machines, files, desks and other necessary office equipment?

( ) 6. Does the administrative head of the school have a properly equipped and furnished private office?

( ) 7. Is a reception room or public waiting area readily accessible from the general office or principal's office?

( ) 8. Are storerooms for office materials and supplies conveniently located?

( ) 9. Is a fire-resistant vault or safe-files provided for storing permanent records?

( ) 10. Are mail and bulletin facilities provided for teachers in the main office?

B. Principal's Office

Although the principal's office should be designed for privacy, it should be accessible and inviting. The arrangement should permit him to work in his office without interruption by persons in the outer office, and should allow him to leave or enter by a private entrance as well as through the outer office. The size should be sufficient to accommodate the necessary office equipment and chairs for perhaps five or six visitors at one time. There should be ample space for book shelves for the principal's library, including books, periodicals, and magazines. A vertical filing cabinet should be conveniently placed near his desk.

( ) 11. Is the principal's office conveniently located?

( ) 12. Is the size of the principal's office acceptable?

( ) 13. Is the arrangement of the office appropriate for the principal's responsibilities?

( ) 14. Is the office properly decorated and furnished?

( ) 15. Is the office properly lighted?

( ) 16. Does the office have a private entrance from the corridor as well as a public entrance through the outer office?

C. Health Service Facilities

It is commonly recognized that the school has some responsibility for providing a health service program for the protection of pupils. The size, arrangement, location, and equipment of the health suite should be based on the policy of health education of the school system. Many schools provide four types of activities: (1) making daily health inspections, (2) conducting medical or dental examinations, (3) administering first aid, and (4) isolating pupils who are ill or in need of rest.

A minimum health facility should include (1) a small waiting room, which will seat comfortably up to four persons; (2) an examining room sufficient in length to allow for the use of an eye chart. This room may be divided by a folding door to establish a nurse's room and a small dental hygiene area. The nurse's room should be equipped with a desk, a lavatory, scales, files, a cabinet for first aid supplies, and other furniture which the nurse deems necessary. The dental hygiene area should have a lavatory, file cabinet for supplies, sterilizer, and some type of a chair; (3) a sick room,

containing at least two cots and a folding door to divide the room, and (4) a toilet room easily accessible from the sick room. Preferably it should open off a small passageway leading from the sick room to the main corridor.

( ) 17. Are the health rooms located so they can be properly supervised?

( ) 18. Is the size of the health suite based on the policy of health education of the school system?

( ) 19. Do the health rooms provide privacy for students?

( ) 20. Are provisions made to isolate immediately students suspected of carrying contagious or infectious diseases?

( ) 21. Are the facilities decorated and furnished properly?

( ) 22. Are toilet and lavatory facilities directly accessible?

( ) 23. Does the health unit have provision for first aid treatment?

( ) 24. Are cots provided for sick children until they can be taken home?

( ) 25. Is the health unit accessible from the corridor?

( ) 26. Are health facilities properly lighted, heated, and ventilated?

D. Teachers' Rooms

Some schools provide a teachers' lounge which is usually located in a classroom wing and is equipped with attractive and functional furniture. The main purpose of the lounge is to provide an area where the teachers may relax for a moment during a free period.

A well planned school should have a teachers' workroom. It should be located adjacent to the administrative office and equipped with a work table, storage space for instructional supplies, cupboard, filing cabinet, typewriter, duplicating machines, and a sink. The purpose of a workroom is to provide a place for the teachers to prepare teaching and testing materials. Some schools need both a teachers' lounge and a teachers' workroom.

( ) 27. Is a faculty lounge provided in the classroom wing of the plant?

( ) 28. Is the lounge equipped with writing facilities and comfortable chairs?

( ) 29. Does the school provide a teachers' workroom?

( ) 30. Is the teachers' workroom located adjacent to the administrative office?

( ) 31. Is the teachers' workroom equipped with suitable work tables, storage space, cupboards, typewriters, filing cabinets, duplicating machines, and a sink with hot and cold water?

( ) 32. Is the room properly decorated, lighted, heated, and ventilated?

E. Guidance Office

Guidance is a specialized function to be performed by special guidance counselors working directly with students. Each counselor should have a reasonably soundproof office sufficiently large to accommodate the pupil, teacher, and/or parent. The guidance unit should be (1) separate from but near the administrative office; (2) accessible by a direct entrance from the corridor; (3) provided with an exit from the counseling area separate from the main entrance; (4) readily accessible to students; (5) readily accessible from the main entrance, (6) reasonably near to related personnel services, and (7) reasonably near the library.

The guidance unit should provide (1) an attractive andcomfortable reception area; (2) private counseling rooms; (3) a multi-purpose room for case consultations, individual testing, and special staff meetings.

The location, grouping, and dimensions of the guidance facilities should be related to the size of the school and the local guidance program.

( ) 33. Are the guidance offices located near the administrative area?

( ) 34. Is the size of the guidance suite acceptable?

( ) 35. Is there an attractive and comfortable reception area?

( ) 36. Are conference rooms provided?

( ) 37. Are ample files and other equipment provided?

( ) 38. Are all guidance facilities attractively decorated and properly lighted?

( ) 39. Are the facilities properly heated and ventilated?

F. Custodians' Room

Every school building should have appropriate custodial facilities depending upon the size of the building. It is important for the school to develop good working conditions by providing (1) a suitable workroom; (2) sufficient and suitable tools; (3) necessary equipment; and (4) adequate storage space. The type of work areas, tools, equipment, and spaces needed will vary with the organization of the work program and the size of the building serviced. It is usually recommended that the custodians' workroom have the following facilities: (1) locker space for clothing, (2) shower and lavatory, (3) a large service sink, (4) ample storage space, (5) work table with vice, and (6) necessary tools and equipment to perform custodial tasks.

( ) 40. Is the size of the custodians' room adequate?

( ) 41. Does the custodian have necessary equipment and suitable tools?

( ) 42. Is the workshop area satisfactory?

( ) 43. Are custodian's locker and washroom facilities acceptable?

( ) 44. Is there sufficient storage space for all janitorial supplies?

( ) 45. Are facilities free from fire hazards?

_____ Number of items checked for ADMINISTRATIVE SPACES area.

_____ Total rating.

IV. Regular Classrooms

A. Elementary

Elementary classrooms should have at least 900 square feet of floor space. The kindergarten-primary rooms should have a minimum area of 1200 square feet. Walls should be decorated in light pastel colors in a non-gloss paint. Ceilings should be finished with a white or off-white acoustical material.

Elementary classrooms should have a sufficient amount of chalkboard and tackboard space provided at eye level. It is suggested that at least two entire walls be utilized for this purpose. Chalkboards should be painted a light green color to reduce glare and to blend with the pastel shades of the walls.

The floor covering should be resilient and fairly light in color with a substantial light reflection. It should blend with the rest of the visual environment. Asphalt or vinyl asbestos tile is acceptable for many school uses.

There should be provided in the classroom (1) a work counter equipped with sink and running water, both hot and cold;(2) shelves for a room library; (3) space for pupils' wraps; (4) some type of display shelf; (5) a teacher's closet for wardrobe and storage purposes; (6) adequate window space; (7) light intensity of 50-70 foot-candles evenly distributed;[1] (8) electrical outlets; (9) proper heat and ventilation; (10) movable furniture; (11) adjustable shades; (12) file cabinet; and (13) a teacher's desk.

( ) 1. Are elementary classrooms of recommended size?

( ) 2. Are there enough regular classrooms and special rooms to house present and predicted enrollments properly?

( ) 3. Are classrooms such that activity groups may work in an area separated from other groups?

( ) 4. Are areas and facilities provided for all of the activities which should take place in the rooms?

( ) 5. Does each classroom have library facilities?

( ) 6. Does the layout of the building permit quick and easy pupil movement from place to place without congestion?

( ) 7. Are floors, walls, and ceilings finished with suitable materials?

[1]Kansas State Department of Public Instruction, Artificial Lighting for Modern Schools, 1960, p. 17.

( ) 8. Are sufficient chalkboards, tackboards, cabinets, and tables of suitable height and type provided?

( ) 9. Is there sufficient space for storage of instructional supplies and audio-visual equipment?

( ) 10. Are all elementary classrooms properly lighted, heated, and ventilated?

( ) 11. Are the elementary classrooms properly furnished and equipped with good movable furniture?

( ) 12. Are adequate provisions made for water use and waste disposal for classroom activities?

( ) 13. Are children's wraps stored in suitable, ventilated wardrobe facilities?

( ) 14. Does each teacher have an appropriate desk, filing cabinet, and wardrobe facilities?

B. Secondary

Regular secondary classrooms should be designed for learning and for teaching. Instructional space for secondary schools must be designed to help the teacher provide an environment which encourages the right kind of learning. Many secondary schools favor lengthening the class period and using a portion of the period for directed study. This type of classroom procedure requires large working surfaces for textbooks, reference books, and notebooks. There is, also, a trend today toward more small group activities within the classroom. Modern practices require flexible seating arrangements and floor areas of 25 or more square feet per pupil.

Secondary school classrooms should be equipped with built-in teachers' closets to provide space for the instructor's wraps and teaching materials. In addition, each classroom should have lockable drawers or compartments available for the storage of materials needed by "roving" teachers who may use the classroom only one or two periods a day.

Regular secondary classrooms should provide the following: (1) ceilings of a white acoustical material; (2) walls in light pastel colors; (3) a light intensity of 50-70 foot-candles evenly distributed; (4) a sufficient number of conveniently located electrical outlets; (5) sufficient chalkboard and tackboard space for the type of class using the room; (6) a light-colored, resilient floor; (7) movable seats, desks, and tables as needed; (8) a

desirable amount of window area; (9) proper heat and ventilation; (10) shelving for room library; (11) display area; (12) darkening devices for visual aids program; (13) charts, maps, and other equipment as necessary; (14) provisions for fire exits; and (15) a suitable teacher's desk and filing equipment.

( ) 15. Do classrooms provide sufficient area to accommodate existing class enrollment in effective learning situations?

( ) 16. Does the general layout and arrangement of classrooms provide for adaptation of instruction to a variety of learning activities?

( ) 17. Does the layout of the building permit quick and easy pupil movement from place to place without congestion?

( ) 18. Are academic classrooms adequately equipped for carrying out the department's objectives?

( ) 19. Are there enough acceptable regular classrooms to house present and predicted enrollments properly?

( ) 20. Are suitable audio-visual educational facilities and materials provided?

( ) 21. Is the interior finish attractive and suited to the use and exposure of individual rooms?

( ) 22. Is the effect of furnishings and fittings harmonious with the finish of floors, walls, and ceilings?

( ) 23. Are sufficient chalkboards, tackboards, built-in closets, and cabinets suitable for existing class enrollments provided?

( ) 24. Are regular classrooms properly heated and ventilated?

( ) 25. Do all classrooms have proper and adequate artificial lighting?

( ) 26. Is acoustical treatment of walls and ceilings provided where needed?

( ) 27. Is classroom furniture in good condition and movable so seating arrangements can be adapted to various group activities?

( ) 28. Are classrooms equipped with clocks connected with a central signal system and functioning properly?

( ) 29. Are provisions made for direct communication with the administrative or general office?

( ) 30. Are good translucent adjustable shades or venetian blinds provided?

_____ Number of items checked for REGULAR CLASSROOM AREAS.

_____ Total Rating.

NOTES:

V. Special Rooms

A. Kindergarten

A child's first day in kindergarten is the beginning of many years of school experiences. What happens on this and succeeding days of the year greatly influences a child's future in school and even his whole adjustment to social living and his development as a personality. The total kindergarten setting then has an important contribution to make to the entire education of the child.

The kindergarten classroom should be located in the primary wing of the building or in a separate unit, and have a minimum of 1, 200 square feet of floor space. A few of the physical properties expected in a good kindergarten room are as follows: (1) good lights; (2) a good heating system with thermostatic control; (3) provisions for adequate ventilation; (4) a good floor for kindergarten children to play on; (5) acoustical treatment of the ceiling; (6) tasteful, attractive decoration; (7) sufficient tackboard and chalkboard space; (8) ample storage space; (9) movable furniture; (10) storage space for play equipment; (11) storage space for children's clothing; (12) individual lockers for all of the children; (13) convenient electrical outlets; (14) shades for the windows; and (15) toilet facilities.

( ) 1. Is the kindergarten room advantageously located?

( ) 2. Does the classroom provide sufficient area to accommodate existing class enrollments in effective learning situations?

( ) 3. Does the general layout and arrangement of the classroom provide for adaptation of instruction to meet the needs of kindergarten children?

( ) 4. Are materials and equipment suitably stored or arranged and readily available for use?

( ) 5. Are adjustable window shades provided?

( ) 6. Is acoustical treatment provided where needed?

( ) 7. Is the classroom furniture conducive to healthful posture and movable so that it can be adapted to various group activities?

( ) 8. Does the decoration of the room provide an appropriate and pleasing environment?

( ) 9. Are the provisions for heating and ventilation appropriate for a kindergarten room?

( ) 10. Have adequate facilities been provided for the storage of children's wraps?

( ) 11. Is sufficient and appropriate artificial lighting provided in the kindergarten room?

( ) 12. Are toilet facilities for kindergarten children available in the classroom?

( ) 13. Is there a separate outside play area provided for kindergarten children?

( ) 14. Are functional lockers provided for the children's supplies?

B. Homemaking

The preferred location of the homemaking department is on the first floor in the main building. An outside entrance is important to facilitate delivery of groceries, installation of equipment and plumbing, use by adult and community groups, management of a play school for small children, and other department activities.

A department composed of a single, all-purpose room is a good arrangement for only one teacher. A general guide for the amount of space needed is 75-80 square feet of floor space per student. Such an all-purpose room provides flexibility in the use of equipment and makes supervision of the entire department possible at all times. Sufficient storage space is very important in any type of arrangement.

The unit kitchen, designed for three or four students, is usually most functional when arranged in U or L-shape. The unit should be composed of a sink and range joined by continuous counter space. For efficiency two L-shaped units may be set back to back. Usually one refrigerator will serve as many as six units.

Two semi-specialized rooms make a more economical department but necessitate close cooperation between the two teachers in planning the program. In this arrangement one room might be equipped for teaching home furnishings, child development, family relations, family health and clothing, and a home living unit. The other room might be equipped to teach meal preparation, laundry, home management, housing and non-

laboratory type lessons. A living or living-dining room is often a part of this type of department. This area should be accessible from both rooms and from the corridor. [1]

( ) 15. Is the homemaking department conveniently located on the first floor of the building?

( ) 16. Are sufficient space and equipment provided to meet both curricular and enrollment needs, and arranged so as to permit a variety of activities to proceed in any one class?

( ) 17. Are the classrooms efficiently arranged, properly furnished, and attractively decorated?

( ) 18. Are kitchen units properly designed, equipped and provided with hot and cold running water?

( ) 19. Is a living center provided and appropriately furnished for offering house-care and hospitality activities?

( ) 20. Are adequate floor space and equipment available for class discussion, study activities, meal service, teaching child development, teaching first aid, and teaching home care of the sick?

( ) 21. Is the clothing area provided with tables of appropriate height, comfortable chairs, sewing machines, storage space, mirrors, ironing boards, and irons which conform to desirable yet practical community standards?

( ) 22. Is an adequate fitting room with full-length mirrors provided?

( ) 23. Are conveniently located outlets provided for all electric and gas appliances?

( ) 24. Is adequate lighting provided at all times in all parts of the laboratories and room areas?

( ) 25. Are adequate facilities provided for storage space, locker space in the different work centers, chalkboard and tackboard space?

( ) 26. Are the home economics rooms provided with a comfortable environment, including a satisfactory heating and ventilating system?

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[1]Kansas State Superintendent of Public Instruction, A Curriculum Guide for Secondary Schools of Kansas, 1960, pp. 3 and 4.

C. Industrial Arts

Industrial arts is an area of learning activity that serves three basic purposes. It is (1) an integral part of general education by presenting a knowledge of industry; (2) it offers a beginning of the specialized knowledge and skills needed by those students who may choose some branch of industrial work as a vocation; (3) it offers one means of creative self-expression by encouraging students to change an envisioned ideal into a tangible object. Such a program is psychologically sound, based as it is upon the investigative, manipulative, aesthetic, and social impulses inherent in all people. [2]

School shops should be located for convenient delivery of supplies from outside the building. The shop building arrangement should be flexible to meet the challenge of changing programs and should provide facilities for planning, investigating, testing, conferring, demonstrating, teaching with visual and auditory aids, and evaluating pupil development, as well as for manipulating tools and other equipment.

A minimum area of 1,500 square feet of floor space should be provided, exclusive of storage space, allowing from 50-75 square feet per pupil. The shop should be rectangular with a minimum width of 30 feet and a ceiling height varying from 12-14 feet. The shop should have a tool room, a storage room, a paint room, a separate room for unfinished projects, common machine areas, provisions for adequate natural and artificial lighting, concrete or hardwood floor, and provisions for fire protection and safety. [3]

( ) 27. Does the location and sound-proofing of the shop area eliminate undue interference with other school activities?

( ) 28. Is the space provided for vocational trades and industrial education adequate to meet the needs of the maximum class enrollment?

( ) 29. Is the shop area well planned and laid out for the curricular offerings?

( ) 30. Are properly equipped areas provided for related instruction?

( ) 31. Is ample natural and artificial light provided to meet the requirements for work in each part of the instructional area?

( ) 32. Is adequate storage space provided for tools and small equipment?

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[2] Kansas State Superintendent of Public Instruction, A Curriculum Guide for the Secondary Schools of Kansas, 1960, pp. 3 and 4.

[3] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 109.

( ) 33. Are proper storage facilities provided for materials and supplies?

( ) 34. Are utility outlets provided where needed?

( ) 35. Are all switches and electrical outlets clearly marked?

( ) 36. Is an adequate paint room provided?

( ) 37. Is there a convenient separate room available for storing finished and unfinished projects?

( ) 38. Are adequate provisions made for fire protection, safety, heating and ventilation to ensure healthful working conditions?

( ) 39. Are shop areas provided with toilet facilities and washing facilities equipped with hot and cold running water?

D. Science

Science rooms should be placed together in a science wing to permit sharing of common teaching materials. Biology and general science rooms are best located with a southern or eastern exposure to permit optimum light for plant-growth areas.

Room arrangements should be flexible and adaptable to a variety of science subjects and teaching methods. Both small and large schools are finding advantages in the trend toward multi-purpose science classrooms which contain laboratory tables designed to accommodate the sciences to be learned in the room, and provide space and seating for non-laboratory activities. It is desirable for the laboratory tables and utility connections to be placed around the perimeter of the room with the central area remaining open for a variety of uses. A minimum of 30 to 35 square feet of floor space per pupil (exclusive of storage facilities) is recommended. An additional 15 square feet per pupil should be provided for storage space.[4]

Facilities should be provided where individual experiments and projects may be carried on and the unfinished projects stored safely for extended periods of time. There should be areas equipped for the construction and repair of science apparatus. Furniture should be adaptable to various-sized groups. Each science room should have a demonstration table 37 inches high and equipped with service utilities.[5] Each room should be adaptable for audio-visual equipment. Safety features should be provided

[4] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 99.

[5] The National Society for the Study of Education, Facilities, Equipment and Instructional Materials for the Science Program, 1960, p. 237.

by the utilization of master shutoff controls and adequate fuses or circuit breakers, and all conduits should be properly grounded. Storage rooms and locker rooms should have adequate ventilation and be equipped with first-aid kits and fire extinguishers. A minimum illumination of 50 foot-candles on all work areas should be provided. Of great importance are adequate storage, preparation rooms, dark room facilities, and science teacher's office space.

( ) 40. Are the science rooms properly and conveniently located?

( ) 41. Are the science rooms and laboratories sufficient in size to accommodate the maximum class enrollment satisfactorily?

( ) 42. Does the general layout of the science rooms provide for adaptation of instruction to meet curricular needs, present and future?

( ) 43. Are classrooms and laboratories adequately furnished for science instruction, including a completely equipped demonstration table which is visible to all members of the class?

( ) 44. Are facilities available for individual experiments and projects?

( ) 45. Are adequate facilities provided for the safe storage of equipment, supplies and hazardous materials?

( ) 46. Is adequate ventilation provided for all science classrooms, laboratories and storage spaces?

( ) 47. Are all science areas properly and adequately illuminated?

( ) 48. Are facilities provided for a darkroom and a preparation room?

( ) 49. Are adequate space and equipment provided for maintaining living plants and animals?

( ) 50. Are adequate facilities provided for display cases, magazine racks, and chalkboard and tackboard space?

( ) 51. Are safety features available and functioning properly, including a satisfactory exhaust fan to remove obnoxious and toxic gases?

( ) 52. Are science instructors provided with a functional materials preparation center, including office space?

E. Art

Art classrooms should be located on the main floor near the homemaking units and general shop. North lighting is desirable, and about 30-35 square feet of floor space per pupil is needed, exclusive of storage area. Special consideration should be given to lighting and decoration for higher levels of illumination, control of shades, and suitability for color discrimination.[6]

This department should be provided with an abundance of storage shelves, drawers, cupboards, exhibit counters, work counters, filing cabinets, picture files, folio trays, storage cubicles for unfinished projects, book shelves, electrical outlets, gas connections, work sink with hot and cold water, large tackboard area, small amount of chalkboard, drawing tables, large work tables, easels, model stands, provision for visual aids, spray equipment, and paper cutters. Potter's wheels, kilns, and other provisions for working with clay are desirable. The art room should be a working laboratory rather than a conventional classroom. Provisions should be available for display of art objects outside the classroom.

The arts and crafts carried on by elementary schools are conducted in many ways: children seated around tables in groups, standing at easels, seated at their desks, standing at work counters, performing handwork at work benches, and otherwise carrying out their activities both within their classroom and outdoors.

The room should be equipped with a large work counter along one side of the classroom, perhaps beneath the windows. A large table or a group of small tables, portable folding easels supplemented by wall-mounted drawing boards, and a trough supporting paint jars, brushes and crayons should be provided.

Other equipment items which should be included are a craft bench, a drying cart for ceramic work, a small upright hand loom, a drying rack on which wet painting may be placed face up, movable work benches, and tackboard and pegboard space.

The arts and crafts room should have good architectural design, color schemes, furniture, fixture and fabrics in order that a child may be constantly reminded of the part which good form, color and line can play in his life.

The supply room should be on the same floor level as the service dock. Doors along the passages should be sized to accommodate traffic.

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[6] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 104.

( ) 53. Is the art room properly and conveniently located?

( ) 54. Has the room been planned to encourage individual and group work?

( ) 55. Has the room been planned to facilitate a diversified art program?

( ) 56. Have provisions been made for work space and storage of drawings and paintings, modeling and carving, weaving and constructing, and printing and arranging?

( ) 57. Does the room have a walk-in storage closet for materials and supplies?

( ) 58. Is ample storage space provided for student work in progress?

( ) 59. Does the art room provide an aesthetically pleasing environment?

( ) 60. Are electrical and gas outlets provided for potter's kiln, enameling oven, electrical tools, gas tanks and torches, and audio-visual equipment?

( ) 61. Is the room properly lighted, heated and ventilated?

( ) 62. Are sinks equipped with sediment traps?

( ) 63. Is storage of tools and materials currently in use so organized that students can get and return them quickly?

( ) 64. Are sufficient tables provided so each student may have 6 to 9 square feet of work surface?

F. Music

It is desirable for music rooms to be located near or adjoining the auditorium-stage. Convenient outside access for community use is advantageous. It is essential that all areas devoted to music be in close proximity and easily accessible to each other. For group vocal work, 16 square feet of floor space per pupil will usually prove sufficient; for instrumental work at least 20 square feet per pupil is needed. These space requirements are exclusive of storage and other facilities.

When terraced floors of the horseshoe type are in use for instrumental music, the width of the steps should be at least 48 inches, and 36 inches

of lateral space should be allowed for each seat. For choral work only, the steps may be 32 inches wide. If the main music room is used for both instrumental and choral work, a 60-inch step may be advisable. This gives ample space for a row of chairs and music racks for instrumental music and two rows for chorus. Adequate space must be allowed for pianos. Level floors are being used increasingly for both instrumental and choral work.[7]

Special sound control is essential for all music rooms. Sound from the music department should not interfere with the work in the quieter areas of the building, but care must be taken not to reduce the reverberation period below the point necessary for desirable brilliancy. In addition to acoustical treatment of ceilings and walls, floors should be sound absorbent, and doors should have sound strips, or double doors should be used to form a sound lock.

Special attention should be given to built-in wall cases and adequate storage for instruments, uniforms, and other equipment for both school and community groups. In large schools special storerooms are necessary. Storage areas should be located so as to minimize the moving of instruments. A small music library with a sorting rack, and an office for the music instructors is essential for a good program.

Classrooms for teaching music theory should be provided as required by the program and they should be convenient to the rest of the music area. Practice rooms are necessary in connection with the music suite. They may vary in size but should contain not less than 60 square feet. Several such rooms will be needed for individual practice as well as one or two larger ones for small group practice.

( ) 65. Are the music facilities advantageously located to provide a minimum of interference with other classes?

( ) 66. Are the music rooms properly designed, lighted, ventilated and acoustically treated?

( ) 67. Are the music facilities adequate in size to meet enrollment and curriculum requirements?

( ) 68. Is the general layout of the music facilities suitable for a functional music program?

( ) 69. Are rehearsal rooms of appropriate size located adjacent to the auditorium stage?

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[7] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 112.

( ) 70. Are properly located practice rooms available for individual and small ensemble work?

( ) 71. Does the school provide conveniently located storage space for instruments, uniforms, and other necessary equipment?

( ) 72. Is adequate provision made for accessible storage of the music library?

( ) 73. Are floors, walls, and ceilings finished with suitable materials to produce a pleasant environment?

( ) 74. Does the school provide appropriate furniture, equipment, and supplies for instructional use?

G. Business Education

The business education programs of most high schools are of a two-fold nature. They serve students who are looking toward vocational training in the business field as well as those who wish to acquire skills or knowledge in specific business areas.

It is recommended that a small high school have a multiple-use business education room. It is difficult to provide such typewriting rooms unless a substantial typewriting desk with disappearing top is used. This type of furniture, however, occupies more space. Nevertheless, since most high school students will be taking typewriting, maximum use should be made of all facilities. Other rooms, such as the bookkeeping and shorthand room, can be adapted to many purposes.

In large secondary schools, facilities should include rooms for bookkeeping, typing, stenography, general secretarial training, distributive education, and other phases of business education. A separate business machines laboratory that can be locked when not in use should be provided. This room should have a work counter and water facilities.

All rooms in the business education suite should allow 25-30 square feet of floor space per pupil and should be provided with ample electrical outlets, filing cases, and both chalkboards and tackboards. A great deal of storage space is needed in each of the business education rooms. An abundance of specifically designed built-in cabinets should be provided for notebooks, charts, books, and special business education supplies.

A typewriting room should have superior lighting, extra acoustical treatment, convenient outlets for all electrical machines, good ventilation, and

a sink and counter. A separate, perhaps smaller, practice room which can be used by typing pupils in their free time during and after school hours is a very desirable adjunct to the business education suite.

A bookkeeping room should have individual type tables for students, a chalkboard across the front of the room, some tackboard space, ample storage space, good lighting, ventilation, and a small library.

( ) 75. Do the size and shape of the business education rooms permit arrangements suitable to the purposes of the courses?

( ) 76. Are the business education rooms grouped together satisfactorily?

( ) 77. Are the rooms used for business machines and typewriters so located or treated acoustically as not to interfere with other classrooms?

( ) 78. Is adequate lighting provided for all of the business education facilities?

( ) 79. Does the school provide an adequate business machines laboratory?

( ) 80. Is the laboratory properly equipped with a work counter and available water supply?

( ) 81. Is space provided for adequate storage of student work and supplies?

( ) 82. Do the rooms have a sufficient number of well-placed electrical outlets?

( ) 83. Are ample provisions made for storage of instructional materials and supplies, use of audio-visual aids, and display facilities?

( ) 84. Are typing rooms equipped with adjustable desks, posture chairs, up-to-date manual and electric typewriters, filing units for individual student use, and ample chalkboard and tackboard space?

_____ Number of items checked for the SPECIAL ROOMS area.

_____ Total rating.

VI. General Service Areas

A. Elementary School Indoor Physical Education Facilities

An elementary school gymnasium-auditorium which is to serve community needs should be at least 50 x 100 feet to allow a basketball playing floor of 42 x 74 feet, and a stage depth of 20 feet at one end of the court. If spectator space is needed, the gymnasium should be wider and folding bleachers provided. Ceiling heights depend upon the school program, however, for elementary basketball, 16 feet is usually a minimum. The floor may be of hardwood or of concrete with an asphalt tile covering. Lighting should be equivalent to 30 foot-candles evenly distributed. Adequate dressing and shower facilities should be provided for both boys and girls. Ample storage space should be available for physical education equipment and other related apparatus.

Many elementary schools have provided multi-purpose rooms which usually include the physical education, music, assembly and program activities, and serve as the school lunch dining area. Frequently these same schools realize to their dismay the inadequacy of such multi-purpose facilities, since frequently the combinations do not work well and certain activities are short-changed. Strictly speaking, a good multi-purpose room should have all of the requirements enumerated in the first paragraph.

( ) 1. Is the elementary school gymnasium well located to serve school and community use?

( ) 2. Is the size of the gymnasium adequate for the physical education program?

( ) 3. Is the ceiling sufficiently high for the gymnasium's intended use?

( ) 4. Is the gymnasium properly lighted?

( ) 5. Are adequate dressing and shower facilities provided to accommodate the maximum class size?

( ) 6. Are locker areas properly lighted, ventilated, and heated?

( ) 7. Is there enough storage space for physical education equipment?

( ) 8. Do the facilities present any hazardous conditions?

( ) 9. Is the condition of the playing floor safe?

( ) 10. Are the stage and related areas satisfactory?

B. Secondary School Gymnasium

A secondary school gymnasium-auditorium area should be located on the ground floor and have at least the following: (1) standard-sized basketball court, 50 x 84 feet; (2) minimum ceiling height of 20 feet; (3) a minimum of 30 foot-candles of light distributed evenly; (4) a stage depth of at least 25 feet, located in one end of the building; (5) folding bleachers parallel with the long axis of the gymnasium; (6) storage space for necessary physical education equipment; (7) appropriate storage space for chairs; (8) storage space for stage equipment, scenery, and piano; (9) ticket office; (10) trophy cases; and (11) proper acoustics.

Conveniently located adjacent to the gymnasium should be dressing and shower facilities. This area should contain at least the following: (1) separate locker and shower rooms for physical education classes and for varsity players; (2) adequate locker facilities; (3) safe and sanitary shower rooms; (4) towel and equipment storage space; (5) equipment drying areas; (6) in-season and off-season storage of equipment; (7) instructor's office, locker and shower; (8) dressing and shower facilities for visiting teams; (9) dressing and shower room for game officials; (10) adequate toilet facilities; and (11) a first aid or treatment room.

It should be emphasized that similar facilities as needed should be provided for girls' physical education programs. Many schools will find it advantageous for physical education classes to have two gymnasiums, one for the boys and one for the girls. Other schools prefer to have a large gymnasium which may be divided, one side for the boys and the other side for the girls.

( ) 11. Is the gymnasium conveniently located on the ground floor?

( ) 12. Do the playing court and the floor meet regulation standards?

( ) 13. Is the gymnasium properly lighted?

( ) 14. Do the stage facilities meet the needs of the school?

( ) 15. Is the heating and ventilating system functioning correctly?

( ) 16. Are ample storage rooms available?

( ) 17. Is the gymnasium space properly designed acoustically?

( ) 18. Are functional dressing and shower facilities of adequate size available?

( ) 19. Are acceptable facilities provided for visiting teams and game officials?

( ) 20. Are adequate facilities provided for instruction rooms?

( ) 21. Are toilet rooms provided for the public within the ticket area?

( ) 22. Is there a sufficient amount of spectator seating?

C. Auditorium

Many school systems use the auditorium as an essential part of the school building. This is due to community needs and to the broadening of the educational program. The auditorium should be located on the ground floor and partially isolated from the rest of the building. It should be accessible to school corridors and related school units such as music, speech, shops, and art.

In a well-designed auditorium with a suitably sloping floor it is essential that the seats be securely fixed to the floor. The seats should be arranged for safety, comfort, sight lines, and acoustics. Preferably, a seat in one row should not be directly in front of a seat in the next row. It is also essential that the rows be far enough apart to provide sufficient knee room.

Generally, orchestra pits are not provided in school auditoriums, but the first row of seats is set back far enough that the school orchestra may be accommodated in front of the stage when it accompanies stage performances.

The size of the auditorium should depend upon school policies, size and program, and the availability of other facilities in the community. Often a small auditorium seating 200-300 with an adequate stage proves more functional than a larger auditorium.

The auditorium should be well ventilated and there should be no discernible noise from the ventilating equipment. The ventilation, the heating, and the acoustics should meet the needs when the auditorium is in use.

Special attention should be given to artificial lighting, electric switches and safety features. At least some lights should be controllable from each entrance. Exit lights are required and should have separate circuits ahead of the main switch.

The stage should be accessible from the corridor or an adjacent room. A minimum depth (from edge to rear wall) of 18 to 20 feet is commonly recommended for elementary and 25 to 35 feet or more for secondary schools. Twenty-five feet is suggested as the minimum width of the proscenium arch for small auditoriums, and as much as 40 to 50 feet for larger auditoriums. The height of the proscenium arch must provide suitable sight lines from the rear seats of the auditorium.

The stage should be equipped with flameproof curtains, drapes, and flats. Lighting should include rear and ceiling spotlights with suitable controls, and provision for overhead colored lights and for the dimming of lights. Adequate provisions should be made for signaling, connections for sound movies, and convenient electric outlets.

Auxiliary spaces should be provided as follows: convenient dressing rooms; a suitable lobby; a ticket booth; checkrooms; a public telephone booth, and public toilets.

( ) 23. Is the auditorium conveniently located on the ground floor?

( ) 24. Are corridors accessible from the auditorium?

( ) 25. Is the floor sloping and are the seats properly arranged?

( ) 26. Is the auditorium sufficiently large for the school needs?

( ) 27. Has proper attention been given to heating and ventilation?

( ) 28. Are the acoustics in the auditorium good?

( ) 29. Does artificial lighting meet present day standards?

( ) 30. Are light switches properly located?

( ) 31. Are related areas, such as music, accessible from the stage?

( ) 32. Are satisfactory dressing rooms and storage space available?

( ) 33. Does the height of the proscenium arch provide suitable sight lines?

( ) 34. Is the stage equipped with flameproof curtains and an outside entrance?

( ) 35. Are stage lights functional?

( ) 36. Are suitable auxiliary spaces provided?

( ) 37. Is the auditorium decorated in pleasing colors?

( ) 38. Are exit lights provided?

D. Library

A functional school library should have the following areas: (1) reading and circulation center; (2) listening and viewing area; (3) conference rooms; (4) classroom area; (5) book stacks; (6) workroom; and (7) office space for the librarian.

In secondary schools the reading room should seat from 10 to 15 per cent of the school enrollment. For best results, it is doubtful whether the reading room should ever seat more than 100 to 150 at one time. Thus, in larger secondary schools, it may be necessary to provide more than one such room. Reading room area should be approximately 30 to 35 square feet per pupil.[1] The reading room should provide (1) sufficient space for tables and chairs; (2) ample space for traffic—5 feet of space between adjacent tables and 5 feet between tables and shelving; (3) adjustable wall shelving; (4) recessed tackboard or pegboard area; and (5) sufficient space for the circulation desk unit.

The room for audio-visual materials in smaller schools may be about 400 square feet, with additional space for listening and viewing. In larger schools, the equipment room should have 300-400 square feet; the materials room 300-400 square feet; and the viewing room 800-1000 square feet.[2]

The conference room should be located adjacent to the reading room and have about 120 square feet of floor space. It should have acoustically treated walls and ceilings and other provisions for making the room soundproof.

The library should have a classroom which is large enough to accommodate one full class. It should be adjacent to the reading room and have an entrance from both the library and the corridor. Its equipment should be similar to that of a regular classroom.

The stack area should be located near the reading room, but not a part of the library reading room. The stack area should provide sufficient space

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[1] [2] American Library Association, Standards for School Library Progress, 1960, p. 119.
[2] Ibid, p. 126.

between stack sections for normal student traffic. If the stacks are open, provision should be made for supervision by the library staff.

There should be one work and office room of some 200 square feet for the smaller schools. Larger schools should have a separate workroom and a separate office. The size will depend upon the enrollment and school program. All workrooms should have adequate work space, including a carefully planned counter (18 to 24 inches deep) with vinyl or formica top, work-type sink, and various sizes of storage drawers and cupboards.

It is advisable for larger schools to provide a periodicals room.

Special attention should be given to providing heat, air-conditioning, ventilation and good natural and artificial light. The ceiling should be acoustically treated for sound control. Draperies for the windows should be in keeping with light requirements and artistic decoration. The floor covering should be noise-reducing material and meet light reflectivity standards. Light switches, electrical outlets, thermostats, telephone, and fire extinguishers should be located where they do not use space needed for shelving.

The library should be equipped with tables and chairs of proper height for the group to be served.

Specifications for Tables and Chairs [3]

	Tables				Chairs
	Height	Width	Length	Diameter (round)	Height
Elementary School	25"-28"	3'	5'-6'	4'	14"-17"
Junior High School	27"-30"	3'	5'-6'	4'	16"-18"
Senior High School	29"-30"	3'	5'-6'	4'	18"

Elementary school libraries are generally rather simple in both organization and accommodations. However, a central elementary library should provide a reading room large enough to accommodate one class of children at one time.

( ) 39. Is the school library centrally located?

( ) 40. Does the library have a functional reading room?

( ) 41. Is the reading room properly equipped?

( ) 42. Are provisions made for an audio-visual materials room?

[3] American Library Association, Standards for School Library Programs, 1960, p. 126.

( ) 43. Is an adequate conference room available from the library?

( ) 44. Does the school provide a library classroom?

( ) 45. Is the library classroom properly located and equipped?

( ) 46. Are the stacks located near the reading room?

( ) 47. Are provisions made for a functional workroom?

( ) 48. Is adequate office space available for the librarian?

( ) 49. Are the library facilities properly heated, ventilated, and lighted?

( ) 50. Does the library have artistic decorations?

( ) 51. Is the library floor made of noise-reducing materials?

( ) 52. Are electrical devices available and properly located?

( ) 53. Are the library facilities treated acoustically?

E. Cafeteria

The school cafeteria is essentially a factory for preparing and serving meals according to a fixed time schedule. If the operation is to be efficient, careful attention must be given to the many details, especially equipment selection and layout. Adequate facilities must be provided for the storage of food products, especially milk and frozen foods.

Preferably the lunchroom should be located at one end of the building so the cooking odors will not permeate throughout the entire building. The dining area should be large enough to feed all of the children in two shifts. All utilities—gas, electricity, water, and sewer—should be available. Special emphasis must be placed on the following in order to have a good lunchroom: (1) sanitizing devices for washing and sterilizing all dinnerware and utensils; (2) adequate sanitary storage facilities; (3) good lighting; (4) cheerful colors; (5) good ventilation; (6) sanitary conditions; (7) minimum amount of noise; and (8) screens for windows and doors.

The amount of space needed for the dining area is 10-12 square feet per pupil to be seated. The dining area should be completely closed off from the kitchen and serving areas. Kitchens located on the long axis of the dining room are preferable.

The dining area should have direct access from the corridors and should have convenient access from the outside. Lunchroom traffic should be planned to avoid interference from corridor to service area, to tables, to soiled dish return and to corridor. A variety of table sizes allows a more flexible arrangement and provides informality.

When dining rooms are used for other activities portable roll-away tables and folding chairs are preferable. Fold-in-wall tables are practical if not more than 300-350 pupils are to be served and especially if physical education classes must be held in dining area. Storage should be provided for tables, chairs, and other equipment used in connection with multiple use activities. This area should be well planned with effective acoustical treatment of the ceilings, some type of tile floors, and a functional heating system.

SPACE RECOMMENDATIONS FOR SCHOOL LUNCHROOM AREAS [4]

Designation of area	Total Lunches Served Daily							
	100-200		200-350		350-500		500-750	
	Min. Sq. Ft.	Max. Sq. Ft.	Min. Sq. Ft.	Max. Sq. Ft.	Min. Sq. Ft.	Max. Sq. Ft.	Min. Sq. Ft.	Max. Sq. Ft.
Receiving area:								
Loading platform	60	60	60	60	80	100	100	160
Receiving area inside building	32	48	48	60	48	60	60	80
Dry food storage area	50	100	100	175	175	250	250	375
Nonfood storage area	15	24	30	40	40	60	60	80
Kitchen area	200	500	400	875	700	1250	1000	1875
Serving area	100	200	200	350	350	500	500	750
Dishwashing area	60	180	105	180	105	210	180	210
Maintenance area								
Garbage area	30	48	30	48	48	60	60	75
Trash area	--	--	--	--	20	30	30	40
Mop area	24	24	24	24	30	40	30	40
Office area	48	60	48	60	48	60	48	60
Locker and toilet area for employees	33	33	48	48	60	60	76	76
Total—Kitchen and Service Areas	652	1277	1093	1920	1704	2680	2394	3821
Dining area, based on 2 seatings daily	500	1200	1000	2100	1750	3000	2500	4500

[4] United States Department of Agriculture, Washington, D. C. A Guide for Planning and Equipping School Lunchrooms, 1956, p. 59.

( ) 54. Is the location of the cafeteria convenient and satisfactory?

( ) 55. Are the kitchen facilities adequate in size to meet recommended standards for present and future enrollments?

( ) 56. Are satisfactory facilities provided for the storage of dry foods and refrigerated foods?

( ) 57. Is the dining area located adjacent to the kitchen and serving area with convenient access from the outside and from the corridors?

( ) 58. Is the dining area sufficiently large to allow approximately 10 to 12 square feet of floor space per person to be seated at one time?

( ) 59. Does the school have convenient access to such utilities as gas, water, electricity and sewer?

( ) 60. Are door and window openings conveniently located, equipped with functional doors, windows, and shades; properly screened with non-corrodible materials, and provisions made for locking kitchen and serving areas?

( ) 61. Are the cafeteria facilities properly equipped with conveniently located and functioning electrical outlets?

( ) 62. Does the school cafeteria meet all sanitation recommendations, such as providing sanitizing devices for washing and sterilizing dishes?

( ) 63. Are the school lunch facilities cheerfully decorated and well heated, lighted, and ventilated?

( ) 64. Does the school provide separate and adequate locker and toilet facilities for the lunchroom employees?

( ) 65. Does the school provide an outside loading platform and a receiving area inside the building to facilitate handling of food and to protect it from the elements during the course of unloading?

_____ Total items checked for the GENERAL SERVICE area.

_____ Total rating.

VIII. Heating, Ventilating, and Air Conditioning

A. Heating

The main sources of heat for schools are coal, fuel oil, natural gas, and electricity. The heating plant consists of the boiler services, the network of heating apparatus throughout the building and the machine room where controls of various types are installed for service. A good heating plant should maintain a given temperature inside the entire building regardless of how cold it may be outside. The system should function with a minimum amount of care and without creating noises or producing combustion gases.

Every heating and ventilating system, whether in a new or old building, should (a) maintain room temperature sufficient to balance heat losses from the body by radiation, convection, evaporation, and by exfiltration from the room; (b) remove excess heat and dilute and remove unpleasant body and other odors; (c) diffuse heat without excessive stratification or drafts; (d) in special cases, remove hazardous gases, vapors, fumes, and dust; and (e) maintain floor slab temperature conducive to good physical comfort.

Heating systems should be so designed that when properly installed and operating they will meet the following standards:[1]

Type of Space	Design Operative Temperature* (Degrees F.)	Corresponding Room Air Temperature Range** (Degrees F.)
(1) Sedentary activity, as in classrooms, laboratories, study halls, auditoriums, lunchrooms, offices.....	72	70-74 (30" above floor)
(2) Moderate activity, as in shops, kitchens, corridors, stairways,....	68	66-70 (60" above floor)
(3) Vigorous activity, as in gymnasium***, multi-purpose rooms.....	65	60-70 (60" above floor)
(4) Special cases:		
(a) Lockers and shower rooms..	78	76-80 (60" above floor)
(b) Swimming pool area.....	83	80-86 (60" above floor)

*The operative temperature represents the mean effect of the temperature of the air of a room and of its walls.

**The lower figure of air temperature in each case is for a room with relatively warm walls; the second figure, for a room with cold walls.

***When gymnasiums are used for auditoriums, the design temperature should be for auditoriums.

1 Minnesota State Department of Education, Guide for Educational Planning of Public School Buildings and Sites, 1957, p. 172.

Regardless of the type of heating system— hot water, steam, or forced air— heating plants should have adequate space to allow for replacement or increases in capacity and be located so that future building additions will not cut off outside access for servicing. Boilers should be spaced to facilitate cleaning and tube replacement. Auxiliary mechanical equipment should be so located and arranged that servicing may be simplified.

Boiler rooms should have fire-resistive floors, walls, ceilings, and doors, and at least one exit should lead directly to the exterior. There should be a fresh air intake provided for proper burner combustion and an emergency cutoff switch. A fire alarm system should be provided and checked monthly. Existing fire escapes should be checked for rust and corrosion to see whether they are structurally safe, and fire extinguishers should be provided and inspected annually.

( ) 1. Is the heating plant large enough to provide adequate uniform heat throughout the entire building when temperature outside is low enough to require heating of rooms?

( ) 2. Is the heating system flexible to provide for partial use of the building, for different requirements in different areas, and can it be readily expanded to meet increased building needs?

( ) 3. Are boiler and furnace rooms large enough to provide for servicing and cleaning the equipment and for access to the chimney clean-out?

( ) 4. Is each boiler room provided with a removable wall panel, a removable window or a large door of ample size for the removal or replacement of any equipment installed therein?

( ) 5. Is the heating system properly vented and is the draft adequate to complete combustion of fuels?

( ) 6. Does the heating system function quietly and automatically, with thermostatic controls in individual rooms?

( ) 7. Are the boiler rooms properly constructed and well maintained to meet state fire and safety codes and regulations, with fire-resistive floors, walls, ceilings, and doors?

( ) 8. Does the heating system provide for an ample supply of fresh air throughout the building?

( ) 9. Are all automatically fired oil and gas furnaces provided with reset flame failure safety cutout devices?

( ) 10. Are any pipes and ducts exposed in occupied areas causing rooms to become overheated and uncomfortable?

B. Ventilation

It is generally agreed among heating and ventilating authorities that some air movement is necessary. The human body will not be comfortable in a pool of stagnant air. Air movement will prevent pockets of excessive humidity, equalize temperature throughout a given space, and remove odors and polluted or stale air. During the heating season, for reasons of comfort, the velocity of air movement should not exceed 25 lineal feet per minute. In warm weather comfort will be increased if air velocity is somewhat greater. [2]

Ventilating methods in general may be roughly classified as window ventilation, mechanical exhaust, mechanical supply, and various combinations of two or more of these methods. The preferred type is a unit ventilator, which is a combination heating and ventilating unit in the form of a room radiator containing a motor-driven fan, automatic controls, and automatic dampers to regulate the amount of outside air to be admitted and the amount of recirculation.

All classrooms, general areas, toilet rooms, and shower and locker rooms must provide adequate, noiseless, draft-free ventilation. Air cleaning may be essential where the air is heavily laden with dust and smoke.

( ) 11. Does the building have any system of mechanical ventilation to create a positive movement of air by the use of a power driven fan?

( ) 12. Does the building have approved air cleaning devices in connection with the ventilating system?

( ) 13. Do the ventilation facilities ensure a sufficient supply of clean air and proper circulation in all classrooms and instruction areas?

( ) 14. Are the ventilation facilities adequate to ensure a sufficient supply of clean air and proper circulation in all corridors and stairways?

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[2] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 174.

( ) 15. Are provisions made for mechanical ventilation of lockers and locker rooms to ensure a sufficient supply of clean air and proper ventilation?

( ) 16. Are adequate provisions made to ensure a sufficient supply of clean air and proper circulation in all toilet rooms?

C. Air Conditioning

When we talk about air conditioning a lot of people say this is something new, but it is not. Nearly every school building in the country has some form of air conditioning. Any time heat is provided in a building, the air is being conditioned. Just from the standpoint of survival, heat must be provided for the physical body.

The cooling power of the air in a classroom plays a very important part in determining the efficiency of the whole learning process in that classroom.

The learning process is greatly facilitated if the movement of the air is not too fast, not too slow, but at such a rate cooling power of the air is invigorating. In that favorable condition of the atmosphere, the teacher has a better chance of being more alert, more enthusiastic, more stimulating, and the pupils more easily interested, more eager to learn; when the classroom operation is conducted with real efficiency combined with comfort, there is less nervous tension, less fatigue, and a greater feeling of well being and sense of accomplishment throughout the whole school day.

How do physiologists and physicians explain these facts?

1. The human body is constantly producing heat due to the metabolic process going on in its cells.

2. Since the body ordinarily maintains itself at a temperature of approximately 98.6°F., the human body is almost always in the position of needing to throw off heat.

3. It throws off heat, slightly in excreta and expired air, but almost entirely through the skin.

4. The skin throws off heat
   - through conduction and convection
   - through radiation
   - through evaporation

5. The rate at which the skin can throw off heat depends upon:
   - the temperature of the air
   - the relative humidity of the air
   - the rate of movement of the air
   - the temperature of surrounding objects

6. When the body is exposed to a cold environment, heat production is augmented by shivering (it may increase the metabolic rate 5 to 7 times) by voluntary movement, by stimulation of the adrenal cortex and thyroid gland. Heat loss is decreased to a minimum by constriction of the blood vessels of the skin, by reduction in plasma volume, by reducing the exposed surface by hunching of the body.

7. When the body is exposed to a hot environment, the first adjustment is vasodilation of the vessels of the skin (this leads to a lowering of the blood pressure which is then compensated for by an increased heart rate). The second adjustment brings the sweat glands into activity and evaporation of sweat from the skin becomes the important method of heat loss, (the temperature at which sweating commences differs with the type and rate of work, the type of clothing and many other factors, but it usually begins when the air temperature rises to 81°F. to 88°F.)

8. The effects of a poorly ventilated classroom are flushed skin, stuffed nose, fast heart rate, sweating, inattentiveness, and restlessness.

9. These effects have been proven not to be due to excess GO2 or insufficient oxygen, not to be due to any toxic substance in the expired air (crowd poisoning), but to heat stagnation and interference with the cooling power of the air. (Herman, Paul, Leonard Hill, New York State Commission on Ventilation).

10. The whole problem of ventilation reduces itself practically to maintaining the cooling power of the air so that it is not too fast and not too slow. [3]

Perhaps the ideal temperature to maintain for classrooms during the winter months should be 72°F. to 75°F. (Relative humidity at these temperatures can be safely ignored; if walls are cold, slightly higher temperatures may be required; if there is direct sunlight, slightly lower temperatures may be required. The air movement should probably not exceed 25-30 feet per

[3]Dr. Dean F. Smiley, What Effect Does Temperature Have on Student Health and Efficiency? Group Session AASA, February 16, 1960, Atlantic City, N. J., p. 1.

minute; the temperature gradient between floor level and head level should probably not be much over 2°F.)[4]

In the spring, fall and summer months when the children are more lightly clothed and are acclimatized to hot weather, the effect might well be to condition the air to 75°F. to 85°F., depending upon the temperature of the outside air. Many physiologists feel that gradients of more than 10°F. between outside air and inside air are dangerous. Some engineers will accept gradients of 10°F., 15°F., or even 20°F. provided that the temperture is never permitted to drop below 75°F. (Relative humidity is usually not important at these temperatures; air movements may be safely up to 40 to 50 feet per minute, the use of wool jackets or sweaters may be necessary when pupils come in sweaty from a period of exercise in the high temperatures out-of-doors.)[5]

( ) 17. Are the instructional areas of the school building air-conditioned?

( ) 18. Is the air-conditioning system adequate to meet acceptable standards?

( ) 19. Is the air-conditioning unit a part of the heating system and does it function through the same pipes and ducts?

( ) 20. If the school building is not air-conditioned, could a cooling unit be successfully installed as a part of the heating system?

_____ Number of items checked for the HEATING, LIGHTING, AND AIR CONDITIONING area.

_____ Total rating.

[4]Dr. Dean F. Smiley, What Effect Does Temperature Have on Student Health and Efficiency? Group Session AASA, February 16, 1960, Atlantic City, N. J., p. 2.
[5]Ibid, p. 3.

VIII. Lighting and Electrical Equipment

A. Lighting

Irrespective of the type of school facilities provided by a school district, normal children must see and hear to do their work effectively. During a regular school day, children will engage in numerous and varied visual tasks including reading, writing, drawing, painting, modeling, working with tools and machines, manipulating scientific apparatus, and watching demonstrations.

These tasks and many others will involve critical seeing, which in turn involves focusing the eyes upon a visual task. Therefore, it is vitally important that the classroom environment be such as to make it possible for the child to see comfortably and efficiently. It is generally recognized that poor visual conditions cause undue expenditure of energy and create tension, thereby bringing about fatigue, irritation, and behavior problems.

The first basic factor in providing a good visual environment is intensity of light. This is the amount of light falling on a given surface and is measured in foot-candles. It must be noted, however, that merely providing a greater amount of intensity does not, in and of itself, guarantee better vision. It is usually recognized that the human eye can, by expansion or contraction of the pupil, adjust itself to a wide range of light intensity, but it cannot adjust to two or more brightness levels existing at one time within the visual field.

The second basic factor is brightness, which is the amount of light reflected from a surface. It is measured in footlamberts. When light strikes a surface, a portion of it is absorbed and the remainder is reflected. The reflection factor is expressed as the percentage of the total amount of light falling upon a surface which is reflected by that surface.

Recommended Reflection Factors for Classroom Surfaces [1]

	Reflection Factors
Ceilings (white or off-white)	80-85%
Window walls, (pastel colors)	75-80%
Other walls (pastel colors)	50-60%
Trim	30-60%
Desk and equipment	35-50%
Floors	20-50%
Chalkboards	15-20%

[1] Kansas State Department of Public Instruction, Artificial Lighting for Modern Schools, 1960, p. 9.

This reflected light produced brightness. Brightness is also produced by direct transmission. For instance, a light fixture in operation is producing light and has brightness.

The usual measure of direct brightness from a light fixture is candles per square inch. The footlambert is the unit used to measure the brightness of otner surfaces. Thus, the relationship between intensity and brightness may be expressed thus: foot-candles x reflection factor=footlamberts. For instance, 50 foot-candles striking a surface with a reflection factor of 80 per cent produces a brightness of 40 footlamberts. The footlambert then, rather than the foot-candle, becomes the prime factor in determining classroom environment for visual comfort and efficiency because it is the reflected brightness that we see and not the light falling upon a surface, such as a desk top.

The National Council on Schoolhouse Construction has adopted the following goals for the total visual environment.

1. The footlambert brightness of any surface viewed from any normal standing or sitting position in the schoolroom should not exceed ten times the footlambert brightness of the most poorly lighted task in the room.

2. The footlambert brightness of any surface immediately adjacent to the task should not exceed three times the task brightness.

3. The footlambert brightness of any surface viewed from any normal standing or sitting position in the schoolroom should not be less than one-third the footlambert brightness of the most poorly lighted task in the room.

4. Brightness-difference between adjacent surfaces should be reduced to a minimum.

5. Light distribution from any source should be of such a nature that direct and specular glare is eliminated for the observer to the greatest possible degree.

6. These goals should be achieved without the loss of a cheerful, friendly and aesthetically pleasing classroom environment.

The brightness goals stated above assume an illumination level from 30 to 50 foot-candles on the reference task. As illumination levels are increased substantially, surfaces of high brightness should more nearly approach the brightness of the task.

A good electric lighting system should produce a uniform distribution of shadow-free, non-glare illumination with the intensities necessary to maintain an acceptable brightness-balance between the task and other surfaces within the total vision environment. Lighting fixtures should not produce a surface brightness on the fixture or on the ceiling that exceeds ten times the task brightness.

Quality lighting in a classroom is a matter of balance of brightness areas. There are three areas of brightness to which a pupil must adjust: (1) the brightness of the task itself (e. g., the page in a book); (2) the brightness of the immediate surroundings of the task (e. g., the desk top); and (3) the brightness of the entire peripheral field of vision (e. g., everything the eye sees in the field of view.)

Measurements of brightness and computation of reflection factors may be obtained by proper use of a foot-candle meter.

LIGHT INTENSITIES FOR KANSAS SCHOOLS [2]

	Recommended Foot-candle Levels*	Minimum Foot-candle Levels**
Classrooms, office, laboratories	70	30
Drafting rooms	100***	50
Sewing rooms	150***	50
Sight-saving rooms	150***	50
Art rooms	100***	50
Shop rooms	100***	50
Study halls	70	30
Libraries	70	30
Cafeterias (not for study)	20	20
Cafeteria kitchens	30	30
Gymnasium, exhibitions, matches	50	30
Multi-purpose rooms	35	30
Swimming pools	30	30
Auditoriums (not for study)	20	15
Corridors and stairways	20	15
Locker rooms, team rooms, etc.	20	20
Entrances, porticos, vestibules, etc.	15	15
Walks and parking areas	1/2	1/2

*The quality aspects of lighting embrace all factors which contribute to visual comfort in the seeing process. It becomes imperative to provide a good quality of lighting, because as higher levels are used in accordance with the recommendations for some of the tasks, it is especially vital that a balanced brightness environment be preserved for utilization of these higher values on the task. If the brightness ratios are exceeded, or if the luminaires become too bright, there will be deleterious effects which will reduce the visibility from that measured by Dr. Blackwell under no-glare conditions.

**Required for minimum accreditation purposes.

***On the Task.

[2]Kansas State Department of Public Instruction, Artificial Lighting for Modern Schools, 1960, p. 17.

( ) 1. Are the ceilings painted or acoustically treated with a white or off-white surface?

( ) 2. Are floor materials light in color?

( ) 3. Is the color of the woodwork and furniture in keeping with the color of the ceilings, walls and floors?

( ) 4. Is the classroom free from surfaces that might cause a glare?

( ) 5. Is the classroom free from dark or shadowed areas?

( ) 6. Do all areas in the classroom produce comfortable contrast of brightness between any surface and the task?

( ) 7. Is the brightness-difference between adjacent surfaces comfortable to the eyes?

( ) 8. Is the light distribution from its source such that direct and specular glare are eliminated?

( ) 9. Is the classroom environment cheerful, friendly, and aesthetically pleasing?

( ) 10. Does the electric lighting system produce a uniform distribution of shadow-free, non-glare illumination?

( ) 11. Are the light intensities sufficient to meet recommended standards?

( ) 12. Is there a proper balance of brightness areas to produce quality lighting?

B. Electrical Equipment

Electrical lines should be of ample capacity for loads, and should be protected from overloads by suitable fuses or circuit breakers. Overfusing should never be permitted since the high line temperatures which result may cause damage to insulation and necessitate replacement of the circuit. The electric system and all motors should be grounded to minimize shock, and motors should be protected with thermal cutouts in addition to line fuses.

At the entrance of each room there should be light switches equipped with insulated toggles and cover plates. All switches must be located away

from possible contact with any moisture. In areas where volatile substances such as paint thinner and gasoline are used, sealed switches and fixture covers should be protected to prevent chance arcing from igniting flammable gases.

Key or pull-chain sockets have no place in instructional or auxiliary rooms. Even though pull-chain sockets may meet safety requirements if they are operated by an insulated cord or chain, little gain in economy is effected by such provision. If lighting fixtures are antiquated or inadequate, probably room circuits should also be replaced. At the same time, suitable switch controls should be provided.

The use of such electronic teaching aids as various projection devices and record players requiring electricity has made it necessary to pay careful attention to the location of electrical outlets in all areas where such equipment will be used. General practice favors at least three conveniently located double outlets per room, one of which should be over the work counter in an elementary classroom.

Care should be exercised to see that extension cords do not extend across traffic lanes. Among the worst offenders in this respect is the speaker line cord for the 16 mm sound projector. Although this line carries only a low voltage, it imposes a traffic hazard which should not be overlooked. Long extension cords laid across traffic aisles pose both a traffic hazard and the possibility of electric shock.

Control panels should be accessible only to competent maintenance personnel. Panels should be of a "dead front" type which protects casual visitors from electrical hazard. Where subsidiary panels are provided, these should be similarly designed to permit use of a control switch without danger of electric shock. In case controls are not provided in a separate panel room, the covering case should be provided with a lock.[3]

Since many school fires are caused by defective electrical wiring, it is very important to make certain that the wiring is adequate and meets the state and local codes. There should be enough circuits to do the job without overloading. Pilot lights should be provided for all electric heat outlets and remote fixtures.

( ) 13. Is the electric wiring adequate and is it done in conformity with the best practice?

( ) 14. Is the wiring of adequate size to carry the load without a voltage drop?

[3]Harper and Brothers, New York, N. Y. Planning Functional School Buildings, pp. 247-248.

( ) 15. Are there enough circuits to do the job without overloading?

( ) 16. Is the electrical system controlled by adequate circuit breakers or fuses?

( ) 17. Are pilot lights installed for all electric heat outlets and for remote or infrequently seen lights and motors?

( ) 18. Are ample light switches and outlets conveniently provided in all classrooms?

( ) 19. Have all key and pull-chain socket fixtures and dangerous extension cords been eliminated?

( ) 20. Are all electrical panels in the building of a "dead-front" panel and is the panel cover provided with a lock?

_____ Number of items checked for the LIGHTING AND ELECTRICAL EQUIPMENT area.

_____ Total rating.

NOTES:

IX. Fire Protection

Fire-resistive construction provides the maximum protection against destruction of property. From the standpoint of safety, however, adequate, well-placed exits are as important as the type of construction. Fire prevention and life safety are a matter of safe construction, proper maintenance, good housekeeping, and appropriate behavior.

All school buildings should be so constructed that there are no large concentrations or expanses of highly combustible materials, such as wood or wood fibers. Adequately protected escape routes should be provided and students trained in their use. Fire extinguishers should be provided, as recommended by the National Fire Protection Association, at hazardous locations and at convenient places throughout the building. The correct type of extinguisher should be available for the kind of fire most likely to occur at each location.

Ideally the building should be one story in height; more than two stories should be avoided. Proper fire escapes, if required, should be well located and in good condition, with particular attention to accessibility and ease and safety of use. Doors opening into central corridors should be constructed with sufficient thickness to resist the pressure of expanding hot air or gases.

Preferably the heating plant and fuel storage rooms should be located outside the building proper. If located within the building, they should be completely enclosed by firewalls and self-closing firedoors. If the heating plant is located in a basement, there must be concrete floor construction over that section of the basement, and approved fire doors. Every furnace room and boiler room must have a direct outside exit.

Corridors and stairways should be fire resistive and should meet standards as to number, location, width, size of risers, treads, railing, and landings. According to the laws in Kansas (G. S. 1961 Supp. 72-4602), "In every school building of two or more stories, every story above the first shall be provided with either: (a) two or more enclosed exit stairs with proper enclosing doors at each floor, including the first floor and basement, together with a separate outside door from the stair enclosure; or (b) two or more sufficient and suitable exterior stair fire escapes, which shall be built of iron, concrete, or steel, and which shall be located as far as possible from unenclosed stairways; (c) every basement room used for assembly purposes shall have at least two separate exits, at least one of which shall lead directly outside the building."

A fire alarm system must be provided and should be so designed that an alarm can be sounded from at least one location in the corridor of each floor, the principal's office, the janitor's quarters, and the heating plant. Horns or gongs should be different from regular bells and situated so they can be heard throughout the building.

Walls and ceilings should be surfaced with non-combustible finish.

Fire exits from upper floors should not be adjacent to combustible walls, ceilings, or areas containing combustible materials.

Children and teachers should not be expected to work in a school building with faulty heating equipment which might cause a fire or explosion or discharge combustion gases into the building. (G. S. 1961 Supp. 72-4604) "School building construction; approval of plans. The construction of all school buildings shall comply with the requirements of the 1955 building code of the national board of fire underwriters, and all electric wiring shall conform to requirements of the 1956 issue of the national electric code or the national fire protection association. Minimum plumbing requirements shall meet the 1955 plumbing code of the American society of mechanical engineers. No contract shall be let for the erection of any school building, and it shall be illegal to pay out any public funds for the erection of a school building until the plans for such building shall have been submitted to the state architect and approved as to all the requirements of this act."

All school building doors must open outward and must be operable from the inside. All exterior doors shall be equipped with panic hardware. (G. S. 1961 Supp. 72-4601) "School buildings, defined; doors to open outward. (a) As used in this act, the term "school building" means any building used or intended to be used for classroom, library, assembly, gymnasium, vocational education or dormitory purposed by any public, private or parochial school. (b) All exterior doors and interior classroom doors of all school buildings shall open outward and all such doors shall be operable from the inside."

( ) 1. Is the building constructed of fire-resistive materials?

( ) 2. Are there adequate, safe, conveniently placed, and properly separated exits?

( ) 3. Does the building have a sufficient number of well-placed fire exits?

( ) 4. Are barriers provided against the spread of fire and gases?

( ) 5. Are a sufficient number of recently checked, well-placed, fire extinguishers provided?

( ) 6. Are safe and properly located fire escapes provided as required by law?

( ) 7. Do all doors open outward and are the exterior doors equipped with panic hardware?

( ) 8. If the heating plant is located in the building, does it meet the standards?

( ) 9. Are corridors and stairways built of fire-resistive materials?

( ) 10. If the building is two or more stories high, are the stairwells enclosed?

( ) 11. Does the building have an adequate and properly installed fire alarm system in good working condition?

( ) 12. Does all electrical wiring meet the national codes for safety?

( ) 13. Are all ceilings or walls surfaced with non-combustible materials?

( ) 14. Does the school provide at least one asbestos fire blanket for each chemistry laboratory, kitchen, and home economics food laboratory which is installed in a metal cabinet identified with the words "Fire Blanket"?

( ) 15. Is the school plant checked periodically for fire hazards and regulations of the office of the State Fire Marshall carefully observed?

_____ Number of items checked for the FIRE PROTECTION area.

_____ Total rating.

X. Water Supply and Sanitary Facilities

A. Water Supply

An adequate source of water supply that is both safe and palatable, particularly the water for drinking purposes, should be provided. Present recommendation is for at least 30 gallons per day per pupil for all purposes.[1] The primary consideration is safety. Water obtained from a municipal water supply, properly supervised and approved by the State Board of Health, and distributed under pressure through correctly designed plumbing, is theoretically acceptable.

If a private supply is used, the water should be tested frequently for safety. With either a public or private supply, the water analysis should be known so that steps can be taken, if necessary, to soften the water and thus to eliminate stains on fixtures and provide for better soap utilization in cleaning.

Drinking fountains should be provided in the ratio of 1-50 pupils with a minimum of one fountain on each floor and two in a school building.[2] Self-contained elementary classrooms should have a drinking fountain in each classroom. There should be at least one drinking fountain in the corridor of each wing of the building. Additional fountains should be located in locker rooms, gymnasiums, shops, and the music room, but never in toilet rooms. A central cooling system serving all drinking fountains is preferable; if this is not possible, unit refrigerated fountains should be provided.

Hot and cold water connections should be provided for homemaking rooms, cafeteria, science rooms, art rooms, lavatories, showers, and other areas as needed.

( ) 1. Does the school have an adequate, safe and palatable water supply source?

( ) 2. Does the water supply provide a minimum of at least 30 gallons per day per pupil?

( ) 3. Is the drinking water tested periodically?

( ) 4. Are there a sufficient number of properly located, sanitary drinking fountains in the building to meet the needs of the students?

[1] National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 182.
[2] Henry Holt and Company, N. Y., From Program to School Plant, 1956, p. 453.

( ) 5. Are a sufficient number of sanitary, refrigerated drinking fountains provided to meet the needs of the students?

( ) 6. Is there sufficient water pressure to eliminate all possible danger of occasional back suction from toilets and sinks?

B. Toilet Facilities

Generally speaking the basement toilet of a generation or more ago has gone the way of the outdoor toilet. Today standard practice calls for attractive modern, sanitary fixtures in tiled, easily cleaned, well-lighted, and well-ventilated toilet rooms on each floor level. It is good practice to provide a separate toilet directly connected with the kindergarten room. Separate toilet rooms may be provided for the first and second grade children. Usually only the kindergarten and first grade rooms have separate toilets.

Toilet room floors preferably should be of ceramic tile or similar impervious masonry material. Concrete and terrazzo are not recommended for toilet floors. Wall surfaces should be of impervious material, such as glazed tile, to a height of at least six feet and preferably to the ceiling.[3]

Toilet rooms should have stall partitions with doors, drains and hose bibs, soap dispensers, waste containers, mirrors, a shelf to hold books, and hand drying facilities. A minimum of two water closets should be provided in each general toilet room.

Suggested ratios for sanitary facilities are as follows:[4]

Toilet bowls	1 for 20 girls	1 for 30 boys
Urinals		1 for 30 boys
Lavatories	1 for 20 girls	1 for 20 boys

A positive mechanical exhaust ventilation with ducts separate from those in other rooms should be provided for all toilet rooms. Showers and dressing facilities should not be in connection with regular rest rooms.

Usually it is desirable to have a separate set of public toilets located near the lobby or entrance to the auditorium and gymnasium.

Water closets should be of vitreous china with elongated bowls and open-front seats. Pressure type flush valves should be provided, if sufficient

[3]National Council on Schoolhouse Construction, Guide for Planning School Plants, 1958, p. 184.
[4]Kansas State Department of Public Instruction, Bulletin 301, 1962, p. 7.

water pressure is available; otherwise the common tank should be used.

( ) 7. Are conveniently located toilet and lavatory facilities provided for girls on each floor?

( ) 8. Are conveniently located toilet and lavatory facilities provided for boys on each floor?

( ) 9. Are the toilet floors constructed of impervious materials contributing to sanitary conditions?

( ) 10. Are the walls of the toilet rooms surfaced with impervious materials?

( ) 11. Are the conditions of the toilet rooms sanitary and in good repair?

( ) 12. Are all lavatory facilities made of impervious materials and provided with hot and cold water?

( ) 13. Are entrances and windows of all toilet rooms properly shielded to ensure privacy?

( ) 14. Are the toilet facilities properly provided with mirrors, adequate supply of soap, towels or mechanical dryers, and toilet tissue?

( ) 15. Does each toilet stool have proper stall partitions with a hinged door to ensure privacy?

( ) 16. Are separate, conveniently accessible toilet and lavatory facilities provided for each of the following: administrative staff, women faculty members, and men faculty members?

( ) 17. Are all toilet and lavatory facilities properly lighted, heated, and ventilated?

C. Locker and Shower Facilities

Fire-resistive, well-ventilated lockers, one for each student, should be provided for general purposes in the corridor of the secondary school building. Special locker alcoves, if properly designed, are acceptable. Lockers should be no closer than 12 to 15 feet from stairwells, and should not interfere with swinging doors. Lockers should also be provided in any areas with more specialized pupil services such as (1) gymnasiums, (2) swimming pools, (3) dressing rooms, (4) visiting team rooms, (5) special

classrooms, and (6) wherever pupils are obliged to keep personal supplies and equipment.

General purpose lockers for street clothes should be from 60 to 73 inches in height and not less than 12 inches wide and 12 inches deep. Hooks and a single shelf are usually standard equipment. The locker system should be master-keyed.

Lockers need not be provided for the first four grades for physical education purposes.

Lockers should be provided for upper elementary grade pupils who participate in a physical education program.

Secondary school pupils need locker and shower facilities. The locker room should provide suitable locker facilities for the storage of street clothing of students while they are involved in the physical education program, and there should be locker facilities for storage of their gymnasium attire when not being used.

Shower rooms should be equipped with numerous drains, surfaced and finished in slip-proof materials. Wall materials should be waterproof and decorated in light colors. Pipes should be concealed with non-clogging swivel type shower heads. Girls' showers should be equipped with one or two individual stalls as well as the group shower. All group shower rooms should be equipped with a curb to prevent overflow.

Team rooms are almost a necessity for secondary schools. Rooms are needed for both home teams and visiting teams. It is undesirable to have a situation in which visiting boys' teams use the girls' facilities because of lack of other suitable quarters.

A team room should be equipped with good lighting, proper ventilation, sufficient lockers, benches, rubbing tables, and first-aid cabinets. An adjacent shower room should have at least one-fourth as many shower heads as the expected squad membership.

( ) 18. Are sufficient fire-resistive and well-ventilated corridor lockers provided for the students?

( ) 19. Is the locker system master-keyed?

( ) 20. Are the lockers large enough to accommodate the usual wraps and books?

( ) 21. Are elementary children provided with good dressing room and shower room facilities?

( ) 22. Are a sufficient number of properly designed lockers provided for elementary physical education?

( ) 23. Does the school provide good dressing room and shower facilities for the secondary students?

( ) 24. Are proper facilities available for storage of street clothing while the student is involved in a physical education class?

( ) 25. Is the shower room equipped with a sufficient number of shower heads?

( ) 26. Is the shower room floor surfaced with slip-proof materials?

( ) 27. Is the girls' shower room equipped with one or two individual shower stalls?

( ) 28. Are separate team rooms provided for both the local and visiting groups?

( ) 29. Are all locker and shower facilities properly lighted, heated, ventilated, and equipped?

( ) 30. Does the school provide adequate facilities and equipment to administer first-aid?

_____ Number of items checked for the WATER SUPPLY AND SANITARY FACILITIES area.

_____ Total rating.

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